Paper No. 26

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte JAW-KAI WANG and TIM HERING

Appeal No. 2001-1973
Application No. 08/734,184

ON BRIEF

Before WILLIAM F. SMITH, SCHEINER, and GRIMES, Administrative Patent Judges.

GRIMES, Administrative Patent Judge.

DECISION ON APPEAL

The examiner has finally rejected claims 1-10, all of the claims remaining.

Claim 1 is representative and reads as follows:

1. A method for continuous culturing of microalgae comprising the steps of providing an open container, providing a culture medium having an aqueous medium and a seed stock of the microalgae in the container, exposing the culture medium to light, maintaining a pH of the culture medium at a fixed level, harvesting a portion of the culture medium at a duration after a predetermined period and adding a replacement seed stock medium to an unharvested portion of the medium, wherein the providing a culture medium step further comprises the step of establishing concentrations of constituent elements in the aqueous medium for unialgal harvesting for promoting optimum growth rates of the microalgae.

The examiner relies on the following references:

Clement et al. (Clement)	3,403,471	Oct. 01, 1968
Dunahay et al. (Dunahay)	5,661,017	Aug. 26, 1997

Timmons (ed.), "Aquacultural Engineering and Waste Management," Proceedings from the Aquaculture Expo VIII and Aquaculture in the Mid-Atlantic Conference, pp. 167-186 (1995)

Claims 1-9 stand rejected under 35 U.S.C. § 102(b) as anticipated by, or alternatively under 35 U.S.C. § 103 as obvious over, Timmons.

Claims 1 and 5-9 stand rejected under 35 U.S.C. § 102(b) as anticipated by, or alternatively under 35 U.S.C. § 103 as obvious over, Clement.

Claims 2-4 and 10 stand rejected under 35 U.S.C. § 103 as obvious over Clement and Dunahay.

We affirm the rejection based on Timmons, do not reach the rejection based on Clement alone, and reverse the rejection based on Clement and Dunahay.

Background

Microalgae are an important food source for shrimp and fish, and therefore microalgae culturing methods are important to the aquaculture industry. See the specification, page 1. In addition, "[c]ompounds which are active against several drug resistant pathogenic bacteria have been isolated from the Chaetoceros sp. microalgae." Id., page 2. Thus, methods of culturing Chaetoceros sp. would be useful in developing new antibiotics. Id.

However, "[e]xisting methods for mass cultivating Chaetoceros sp. and other microalgae have proven inadequate. The primary difficulty in culturing

Chaetoceros sp. microalgae is that undesirable species contaminate and outcompete Chaetoceros sp. microalgae in culture vessels and outdoor algal systems." Id., page 3. The specification discloses "an open, continuous microalgae culture system that optimizes culture conditions for microalgae, such as Chaetoceros sp. marine microalgae, in a cost effective manner." Id., page 4. The disclosed system improves on previous culture methods by "establish[ing] optimal culture conditions for Chaetoceros sp. microalgae and provid[ing] for the outdoor culturing of the microalgae. No water treatment systems are needed as the Chaetoceros sp. microalgae outcompetes other species of microalgae in the culture." Id., pages 4-5.

Discussion

1. Claim Grouping

Appellants state that "[t]he claims do not stand or fall together." Appeal Brief, page 6. Under the applicable rule, however, Appellants must do more than simply assert the separate patentability of the claims. See 37 CFR 1.192(c)(7): The claims subject to each ground of rejection will stand or fall together "unless a statement is included that the claims of the group do not stand or fall together and, in the argument . . ., appellant explains why the claims of the group are believed to be separately patentable."

Appellants' Brief presents no argument to support the asserted separate patentability of the claims over the prior art. Instead, Appellants simply repeat the limitations of each claim subject to each rejection. See the Appeal Brief, pages 7-8, 9-10, and 15-16. However, Rule 192(c)(7) expressly states that

"[m]erely pointing out differences in what the claims cover is not an argument as to why the claims are separately patentable." Appellants make no effort to explain how the different limitations of the claims establish separate issues of patentability.

Since Appellants have not complied with the requirement of Rule 192(c)(7) to explain why the claims are believed to be separately patentable, all of the claims subject to each ground of rejection will stand or fall together.
In particular, the claims rejected for anticipation will stand or fall with claim 1.

Claim 1 is directed to a method for "continuous culturing of microalgae." The claimed method comprises six steps: (1) providing an open container, (2) providing an aqueous culture medium comprising a seed stock of microalgae, (3) exposing the culture medium to light, (4) maintaining the pH of the culture medium at a fixed level, (5) harvesting a portion of the medium after a predetermined period, and (6) adding replacement seed stock medium to the unharvested portion of the medium. The claim also states that the step of initially providing the culture medium "further comprises the step of establishing concentrations of constituent elements in the aqueous medium for unialgal harvesting for promoting optimum growth rates of the microalgae."

2. Timmons

The examiner rejected claims 1-9 as anticipated by Timmons,[1] and cited pages 168-170 of the reference as disclosing all of the limitations of claim 1. See the Examiner's Answer, page 4.

We agree that Timmons anticipates claim 1. Timmons discloses a process comprising (1) providing open containers (see page 168), (2) providing an aqueous culture medium (seawater supplemented with nutrients, see pages 168 and 169) comprising a seed stock of microalgae (page 168), (3) exposing the culture medium to sunlight (sentence bridging pages 168 and 169), (4) maintaining the pH of the cultures "within 0.2 pH units of [a] setpoint" (page 169), (5) harvesting a portion of the medium after a predetermined period (page 170: "[A]ll the cultures were mixed . . . and five hemacyter slide counts were made."), and (6) adding replacement seed stock medium to the unharvested portion of the medium (page 170: "Th[e] mixture is then used to reseed each treatment to achieve the starting density specified.").

The method disclosed by Timmons thus meets all the limitations of instant claim 1. "It is well settled that a claim is anticipated if each and every limitation is found either expressly or inherently in a single prior art reference." Celeritas Techs. Ltd. v. Rockwell Int'l Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522 (Fed. Cir. 1998). Claim 1 is unpatentable under 35 U.S.C. § 102(b). Claims 2-9 fall with claim 1.

[1] The examiner alternatively rejected claims 1-9 as obvious in view of Timmons. Since we conclude that the reference anticipates at least claim 1, we need not reach the alternative ground of rejection.

Appellants argue that Timmons "concludes on page 181 that the 'critical levels of each of these factors remain to be found.' That statement clearly leads away from the present invention which defines all the factors for the optimal harvesting of single algae as defined in the present claims." Appeal Brief, page 8.

This argument is not persuasive. First, "the question whether a reference 'teaches away' from the invention is inapplicable to an anticipation analysis." Celeritas Techs., 150 F.3d at 1361, 47 USPQ2d at 1522. In addition, if Appellants' intended meaning was that Timmons does not anticipate because it does not disclose "all the factors for the optimal harvesting of single algae," the argument is still unpersuasive. It is true that, in addition to the six manipulative steps recited above, claim 1 "further comprises the step of establishing concentrations of constituent elements in the aqueous medium for unialgal harvesting for promoting optimum growth rates of the microalgae."

The specification defines "optimal conditions" to mean "those that allow a seed stock of microalgae to grow and outcompete predators, contaminants and other potential scavengers." Page 9. The claim language thus requires establishing concentrations of elements in the medium such that the medium promotes growth at a rate that will outcompete contaminants and other potential scavengers.

Timmons meets this limitation as well. Indeed, the whole point of the experiments described in Timmons was to establish parameters to promote optimum growth rates. See, e.g., page 167: "The goal of these experiments is to

determine the culture conditions which would enable Chaetoceros sp. to outcompete other species of algae in an open culture system." Timmons determined that nutrient level, pH control, seeding level, and full sunlight affected the density of Chaetoceros sp. growth. See pages 179-180. In particular, Timmons concluded that "Chaetoceros sp. dominated their cultures with continuous addition of nutrients at a very low level (3.63×10^{-2} mg N/l, 2.12×10^{-2} mg P/l)." The process disclosed by Timmons therefore comprises "establishing concentrations of constituent elements in the aqueous medium for unialgal harvesting for promoting optimum growth rates of the microalgae."

Appellants also argue that "Timmons points out that having varied pH provides opposite results indicating that specific pH determination would require undue experimentation to yield optimal output of any particular microalgae." Appeal Brief, pages 8-9.

This argument is also not persuasive. First, the claims only require that the pH be maintained at a "fixed" level, not at an optimal level. In addition, Timmons discloses that maintaining the pH of the culture medium at 8.0 (± 0.2 pH units) "result[ed] in increased Chaetoceros sp. density," compared to no control of pH. See page 180 and page 171 (Table 2). The record therefore provides no support for Appellants' assertion that Timmons does not teach this feature of the claimed process.

3. Clement and Dunahay

The examiner rejected claims 1 and 5-9 as anticipated by Clement, and rejected claims 2-4 and 10 as obvious in view of Clement and Dunahay. We

have concluded, supra, that claims 1-9 are anticipated by Timmons. Therefore, we need not consider whether claims 1 and 5-9 are also anticipated by Clement.

The examiner combined Clement with Dunahay in order to meet certain limitations of the dependent claims. For example, claims 4 and 10 are directed to the method of claim 1, but include the additional limitations that "the harvesting step comprises removing about 90% of the culture medium" (claim 4) or that "the tank is generally cylindrical having a diameter of about 18 inches and a height of about five feet, and the tank is made of fiberglass material" (claim 10).

The examiner conceded that Clement does not teach these limitations. See the Examiner's Answer, page 7: "The claimed subject matter differs from the disclosure of Clement et al[.] in that the nutritive elements of silicate and iron chloride and vitamin B_{12}, and harvesting of Chaetoceros algae in an amount of about 90% from a tank having a diameter of 18 inches and a height of about five feet made of fiber glass is not taught."

The examiner cited Dunahay to make up these differences, but did not point to any specific disclosure in Dunahay that would have suggested these limitations to a person of ordinary skill in the art. See the Examiner's Answer, pages 8-9:

> [I]n order to maintain a constant algae concentration, as taught by Clement et al[.], one of ordinary skill would have expected that about 90%, or almost all, of the algae would be required to be removed and replenished as required by Clement et al. . . . Therefore, the harvesting of about 90% of the algae is well within the skill of an ordinary artisan seeking the desired optimal conditions, as well as, the expected result of maximal algae growth output during a continuous culturing process.

> . . . Further, additional elements such as iron chloride, silicate and vitamin B12 are clearly suggested, if not taught, by Dunahay et al[.] to be useful for culturing algae. Also a bioreactor fiber glass tank as described by applicants having a circular diameter of 18 inches and a height of five feet is conventional in the art[. A]lthough the specifications of appellants' tank are not precisely disclosed such conventional tanks are well known and their use would have been obvious to one of ordinary skill in the art in the absence of any unexpected successful results.

"In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a prima facie case of obviousness. Only if that burden is met, does the burden of coming forward with evidence or argument shift to the applicant." In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). The prima facie case must account for all the limitations of the claims. See General Foods Corp. v. Studiengesellschaft Kohle mbH, 972 F.2d 1272, 1275, 23 USPQ2d 1839, 1840 (Fed. Cir. 1992) ("[E]ach claim is an entity which must be considered as a whole.") (emphasis in original); In re Angstadt, 537 F.2d 498, 501, 190 USPQ 214, 217 (CCPA 1976) ("[W]e must give effect to all claim limitations.") (emphasis in original).

Even when all of the elements of a claimed invention are individually taught in the prior art, there must be some reason, suggestion, or motivation that would have led a person skilled in the art to combine those elements. See In re Kotzab, 217 F.3d 1365, 1369-70, 55 USPQ2d 1313, 1316 (Fed. Cir. 2000): "[I]dentification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. Rather, to establish obviousness based on a combination of the elements disclosed in the prior art,

there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant."

"[E]vidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved. . . . The range of sources available, however, does not diminish the requirement for actual evidence. That is, the showing must be clear and particular. Broad conclusory statements regarding the teaching of multiple references, standing alone, are not 'evidence.'" In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) (citations omitted).

Here, the examiner has pointed to nothing – in the prior art, the knowledge of a skilled artisan, or the nature of the problem to be solved – that would have led a skilled artisan to modify the method disclosed by Clement in such a way as to meet the limitations of claims 2-4 and 10. Therefore, the examiner has not carried her burden of showing a prima facie case of obviousness, and the rejection under 35 U.S.C. § 103 is reversed.

Summary

We affirm the rejection based on Timmons because the reference discloses all of the limitations of independent claim 1. However, we reverse the rejection for obviousness because the examiner has not shown that a person of skill in the art would have been motivated to combine the cited references. Thus, claim 10 is not subject to any outstanding rejection.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED IN PART

William F. Smith Administrative Patent Judge	))))) BOARD OF PATENT
Toni R. Scheiner Administrative Patent Judge	)) APPEALS AND)) INTERFERENCES
Eric Grimes Administrative Patent Judge	))

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